MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

POC0335 – ORGANIC CHEMISTRY

(Foundation in Life Sciences students only)

6 MARCH 2017
2.30 p.m. – 4.30 p.m.

(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **5** pages only excluding the cover page.
2. Answer **ALL** questions.
3. Please write all your answers in the answer booklet provided.
4. Distribution of marks for each question is given.

Instructions: Answer **ALL** questions.

Question 1 [20 marks]

a. Explain the following statements. [2 × 2 marks]

(i) The boiling points of alkanes increase with molecular weight.

(ii) Methanol is a liquid and ethane is a gas at room temperature though their molecular weight is almost the same.

b. Draw and name the alkyl groups (two for each) originating from: [2 × 2 marks]

(i) propane

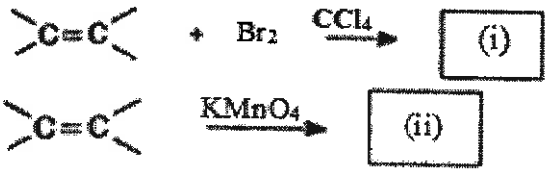
(ii) *n*-butane

c. Give the structural formulas for the reactants that form 2-butene when treated with the following reagents: [2 × 1 mark]

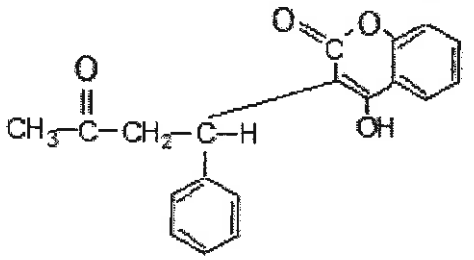
(i) heating with concentrated H_2SO_4

(ii) hydrogen and a catalyst

d. Complete the following reaction and give the name of the process. [2 × 2 marks]



e. A pesticide has the formula shown below:

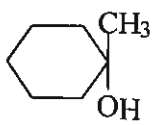


(i) Identify TWO functional groups that are present in the pesticide. [2 marks]

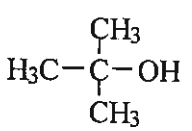
(ii) Copy the formula above and mark the chiral carbon(s) in this molecule with an asterisk (*). [1 mark]

(iii) Write the molecular formula of this pesticide. [1 mark]

f. Identify the secondary alcohols. [2 marks]



(i)



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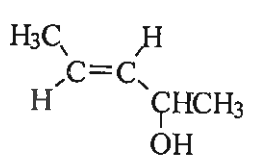

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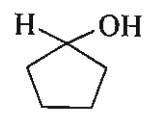

(iv)

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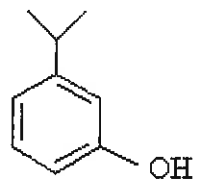
Question 2 [20 marks]

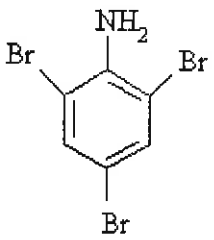
a. Below are common names for the monosubstituted benzenes. Draw the structure for each of them. [4 × 1 mark]

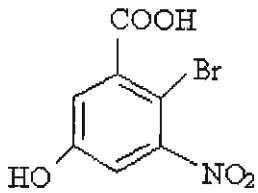
(i) styrene
(ii) aniline
(iii) benzaldehyde
(iv) phenol

b. Show how *m*-chloronitrobenzene could be synthesized from benzene. [4 marks]

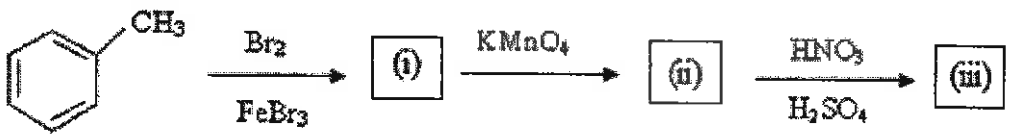
c. Name the following compounds. [3 × 2 marks]

i) 

ii) 

iii) 

d. Complete the following reaction and give the name of the final product. [4 marks]



e. What would be the product of a Friedel-Craft alkylation if benzene reacts with the following alkyl chlorides? [2 × 1 mark]

(i) CH_3CH_2Cl
(ii) $CH_3CH_2CHClCH_3$

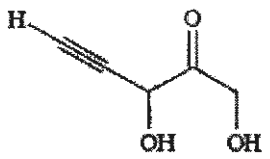
Continued.....

Question 3 [20 marks]

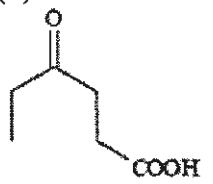
a. Using four carbon atoms and the required number of hydrogen atoms, draw structures for three primary amines and a symmetrical secondary amine. [4 marks]

b. Give the IUPAC name for each of the following compounds: [4 × 2 marks]

(i)



(ii)



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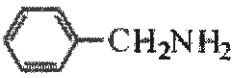

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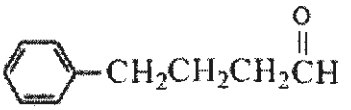
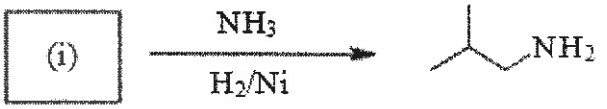
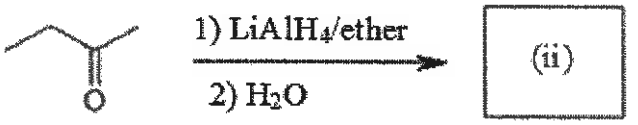
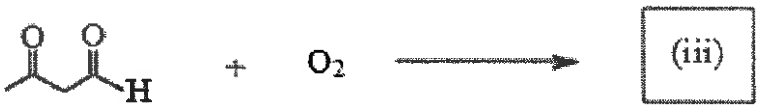


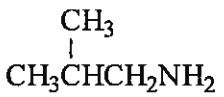
c. Complete the following reactions: [3 × 2 marks]



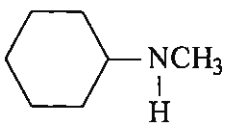




d. Identify the secondary amines from the following structures: [2 marks]



(i)



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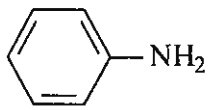

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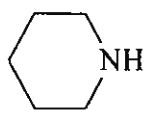

(iv)

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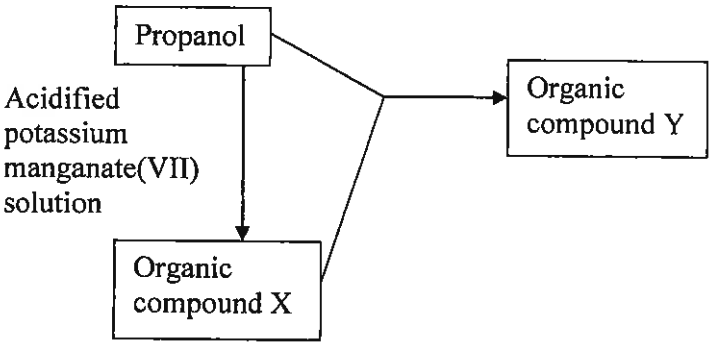
Question 4 [20 marks]

a. Give the names of the acid and the alcohol used to prepare the following esters. [2 × 2 marks]

(i) $HCOOCH_3$
(ii) $CH_3(CH_2)_3OOCCH_2CH_3$

b. Propanol reacts with acidified potassium manganate(VII) solution to produce an organic compound X. [4 × 1 mark]

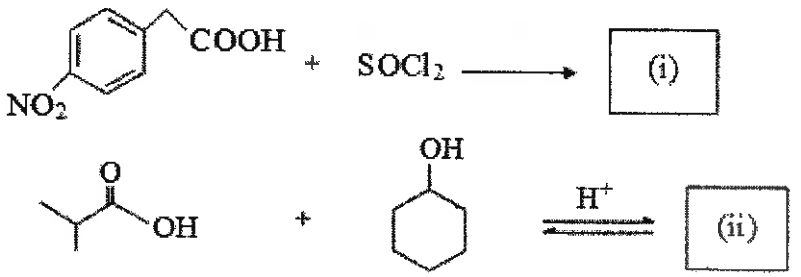


(i) Name the reaction for changing propanol to the organic compound X.
(ii) Construct an equation to represent this reaction.
(iii) Name a reagent which can be used to derive organic compound Y when propanol and organic compound X react with one another.
(iv) Draw the structural formula of compound Y.

c. Write equations for the reactions between hydroxyethanoic acid and, [2 × 2 marks]

(i) sodium hydroxide
(ii) ammonia solution

d. Complete these reactions: [2 × 2 marks]



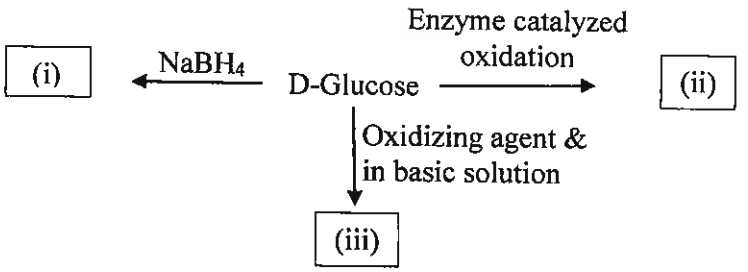
e. Draw the structures for the following organic compounds. [2 × 2 marks]

(i) 3-phenylpropanoic acid
(ii) Butanedioic acid

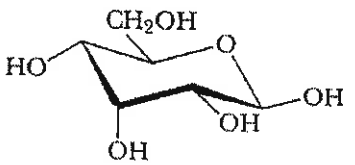
Continued.....

Question 5 [20 marks]

a. Complete the following reactions by giving the name of the compounds formed.
[3 × 1 mark]

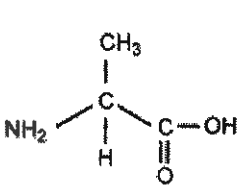


b. Below is the chair conformation of D-Allose. Convert it to an open-chain form and then to a Fischer projection.
[2 × 2 marks]

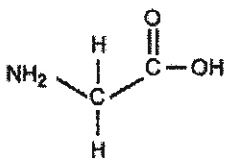


c. Monosaccharides are classified by their number of carbon atoms. For example, the monosaccharide with molecular formula $C_3H_6O_3$ is named as triose. Give the molecular formula and name for the following classes of monosaccharides. [2 × 2 marks]
(i) a 4 carbons monosaccharide
(ii) a 6 carbons monosaccharide

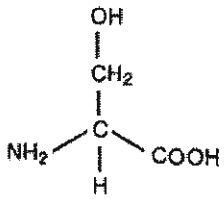
d. Amino acids are the building blocks of naturally-occurring polymers called proteins. Consider the three amino acids below,



Alanine (pI = 6.11)



Glycine (pI = 6.06)



Serine (pI = 5.68)

(i) State the abbreviation for alanine and glycine. [1 mark]
(ii) Draw the zwitterion structure for serine. [1 mark]
(iii) Draw the structure of the products formed when alanine reacts with NaOH. [1 mark]
(iv) Deduce the structure of the tripeptide formed and indicate the peptide bond in the structure. [3 marks]
(v) Predict the direction of each amino acid during electrophoresis at pH = 6.06. [3 marks]

End of Paper